MARSSIM Innovative Characterization at NTS

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For the

DDFA Midyear Review

Hilton Salt Lake City Center

March 6, 2002

NTS MARSSIM Deployment Background

- There are three components to the NTS MARSSIM Innovative Characterization:
  - R-MAD Exterior Final Release Survey
  - Brookhaven National Laboratory (BNL) support to support the NTS ISOCS deployment
  - Development of statistical basis for three dimensional MARSSIM surveys, not discussed
  - The field components of the first two components have been completed, draft Cost and Performance Report in review
  - Where appropriate the first two components will evaluated for each of the grading criterion

Criterion 1 – Relevancy & Technical Approach

- Project Goals –
  - The R-MAD Building exterior final verification survey goal was to compare a MARSSIM survey plan to the baseline methodology based on DOE Order 5400.5
  - The BNL support for the NTS Institu-Object Counting System (ISOCS) consisted primarily reducing NTS start up problems by passing on the expertise (i.e., lessons learned) developed in their FY 99 through FY 00 ISOCS ASTD.

Criterion 1 – Relevancy & Technical Approach (Continued)

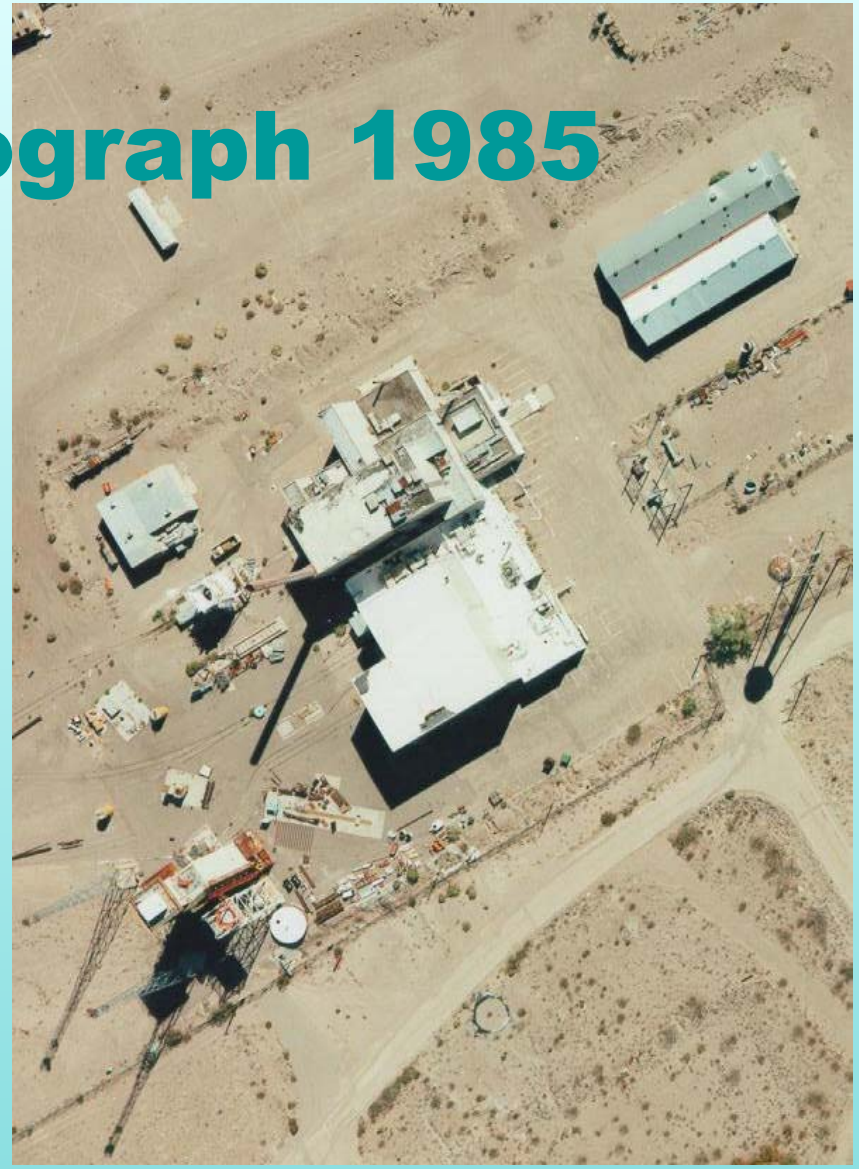
- R-MAD Exterior MARSSIM Final Verification Survey
  - Baseline survey approach is outlined in the NTS/YMP Radiation Control (RadCon) Manual, which is based on DOE Order 5400.5
  - While the RadCon Manual does allow for a graded approach for release surveys; modifications are approved on a case-by-case basis
  - Implementation of MARSSIM brings risk management approach into final release surveys.
  - Use of MARRSIM techniques results in a readily defensible and repeatable survey

Criterion 1 – Relevancy & Technical Approach (Continued)

- NTS ISOCS Deployment
  - NTS personnel trained by BNL personnel on actual radiological sites at both BNL and NTS
  - Modification of existing BNL operating procedures and QA/QC Plan accelerated NTS ISOCS implementation by 2 months
  - BNL personnel reviewed NTS ISOCS models and where appropriate developed specific geometry models at the request of NTS personnel
  - BNL staff provided expertise during the R-MAD roof final verification survey by help developing the roof geometric model as well as collecting the ISOCS survey data

R-MAD Arial Photograph 1985

- R-MAD Building was constructed in 1959
- MARSSIM release survey was completed on all exterior walls and the roof
- MARSSIM release survey was completed during a 3 week period last spring



IOCS Counting Activity within B-25 Waste Box

- ISOCS software in conjunction with a calibrated detector can be used to determine the activity within complex geometries
- Complex geometries for waste containers or layered roofing material can be accurately modeled
- Use of ISOCS reduces the number of samples requiring off-site laboratory analysis

Figure 1
ISOCS Detector Analyzing B-25 Waste Box

Criterion 1 – Relevancy & Technical Approach (Continued)

- Both MARSSIM and ISOCS are mature technologies that have been deployed at a number of commercial and government sites
- This project was developed so that these technologies could be evaluated at the NTS in such a manner that application risk was shared between the NTS and EM-50
- The deployment of MARSSIM across the DOE Complex is gathering common acceptance. Once it gets deployed at a site and the advantages become evident to Radiation Control Organization it soon becomes the baseline approach
- ISOCS has also been widely deployed across the DOE Complex. ISOCS is a versatile tool that can be used for MARSSIM release surveys, waste characterization, object characterization, etc.

Criterion 2 – Benefits

- R-MAD Exterior MARSSIM Final Verification Survey
  - Use of MARSSIM reduced final verification survey by over 800 hours
  - Use of ISOCS to support final verification survey resulted in an 40 hour program reduction
  - Use of MARSSIM increased worker safety by reducing the number of survey locations required for the verification of the R-MAD exterior walls and roof
  - No significant limitations were identified for either the MARSSIM Final Verification Survey or the ISOCS

Criterion 2 – Benefits (Continued)

- A Technology Safety Data Sheet was not prepared for either the MARSSIM survey or ISOCS
- There are no specific safety features associated with either technology, however the ISOCS does increase worker safety by being able to remotely quantify activity within containers without requiring worker to sample the contents
- Implementation of these technologies has resulted in some inadvertent safety results associated with reduced sampling requirements for MARSSIM and remote characterization using ISOCS
- No design, operation, or maintenance modifications were required to improve the safety authorization basis for these technologies

Criterion 2 – Benefits (Continued)

- Implementation of MARSSIM will result in acceleration of project schedules, reduce project costs, provide a consistent and repeatable survey, and result in a safer project (due to reduction in survey scope)
- Implementation of ISOCS results in a greater flexibility in characterization and verification activities. Characterization within complex geometries can be completed remotely resulting in decreased sampling costs, accelerated schedules, and greater employee safety

Criterion 2 – Benefits (Continued)

- Potential for MARSSIM and ISOCS to become Baseline Technology
  - Until the NTS/YMP RadCon Manual is revised, use of MARSSIM will be evaluated on a case-by-case basis. The NTS D&D Baseline will be modified to state that final release surveys will be based on MARSSIM methodologies. Other NTS baselines will be slower in changing to MARSSIM approach
  - ISOCS deployment has already spread from the NTS D&D program to Waste Management. The NTS D&D Baseline will be modified to include deployment of ISOCS for waste characterization, object characterization, and soil characterization/verification

Criterion 3 – Technical Progress

- Received funding in February 2001 completed the following MARSSIM tasks:
  - Sent three NTS D&D staff to MARSSIM training class
  - Developed and received approval from RadCon and state regulator for R-MAD Exterior MARSSIM final verification survey plan
  - Implemented the MARSSIM final verification survey
  - Consolidated all data and developed final verification maps (end of FY 01 activities)
  - Wrote draft Cost and Performance Report and R-MAD MARSSIM final Verification Survey report (in review as of 2/28/02)

Criterion 3 – Technical Progress (Continued)

- Received funding in February 2001 completed the following ISOCS tasks:
  - Went to BNL for site-specific training in March 2001
  - Modified BNL ISOCS procedures and QA/QC Plan
  - Attended Canberra ISOCS User Conference in April 2001
  - BNL field visit to NTS to assist D&D personnel for R-MAD roof final verification survey and development of ISOCS waste container geometries in May 2001
  - Second BNL field visit to NTS to assist in characterization of contaminated piping and ventilation in R-MAD basement – delayed from September to December due to 9/11/01 activities

Criterion 3 – Technical Progress (Continued)

- MARSSIM Technical, Cost, & Schedule Status
  - The technical scope of work for the MARSSIM and ISOCS has been completed. A draft Cost and Performance Report has been completed and is currently under review
  - The cost variance for the NTS component through January is 3% ($1,195) which is within acceptable limits
  - The schedule variance for the NTS component through January is –23% (-$10,415). The schedule variance is a result of not having the resources to complete the draft MARSSIM Cost and Performance Report completed by December 31, 2001

Criterion 3 – Technical Progress (Continued)

- Community, Regulatory, and/or Other Stakeholder Interface
  - NTS D&D Program is regulated under Federal Facilities Agreement and Consent Order (FFACO)
  - NDEP was apprised that MARSSIM would be used to perform final verification surveys
  - NDEP requires that the MARSSIM final verification surveys be documented final closure report
  - There has been no other exterior interface

Criterion 3 – Technical Progress (Continued)

- Commercialization Activities:
  - MARSSIM is a process developed by NRC, EPA, DoD, and DOE and has been deployed in both private and government sites it is a fully mature technology
  - ISOCS was developed by Canberra Industries and is fully commercialized

Criterion 3 – Technical Progress (Continued)

- Has Project undergone ASME Peer Review
  - Neither the NTS MARSSIM or ISOCS has undergone ASME peer review
  - This project was funded in February 2001, so it did not undergo DDFA mid-year review

Criterion 3 – Technical Progress (Continued)

- Invention or Intellectual Property Issues
  - There are no issues associated with either MARSSIM or ISOCS